CBSE TEST PAPER-03

CLASS - XI CHEMISTRY (Chemical Bonding and Molecular Structure)

General Instruction:

- All questions are compulsory.
- Marks are given alongwith their questions.

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1. Define dipole moment. [1]

2. Give the mathematical expression of dipole moment. [1]

3. Dipole moment is a scalar or a vector quantity? [2]

4. Why NH_3 has high dipole moment than NF_3 though both are pyramidal? [2]

5. Why is dipole moment of CO_2, BF_3, CCl_4 is zero? [1]

6. Why is BF_3 non – polar? [1]

7. Write the resonating structure of O_3 molecule. [1]

8. Draw the resonating structure of NO_3^- [2]

9. On which factor does dipole moment depend in case of polyatomic molecules. [2]

10. Dipole moment of Be F_2 is zero. Give reason. [2]

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[ANSWERS]

Ans1. Dipole moment is defined as the product of the magnitude of the charge and the distance between the centers of positive and negative charge.

Ans2. Mathematically dipole moment is expressed as dipole moment (M) = charge (Q) x distance of separation (r). Dipole moment is usually expressed in Debye units (D).

Ans3. Dipole moment is a vector quantity and is depicted by a small arrow with tail on the +ve centre and head pointing towards the negative centre .

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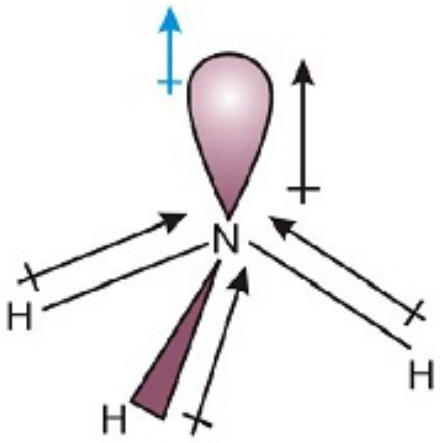
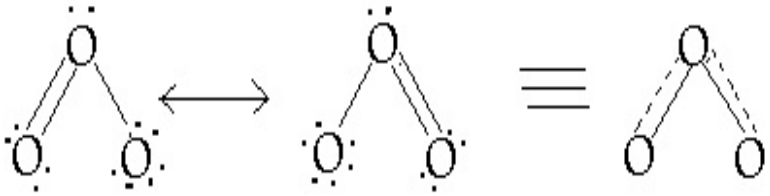
Ans4. In case of NH_3 the orbital dipole due to lone pair is in the same direction as the resultant dipole moment of the N-H bonds, whereas in NF_3 the orbital dipole is in the direction opposite to the resultant dipole moment of the three N-F bonds. The orbital dipole become of lone pair decreases, which results in the low dipole moment.



Ans5. Because there molecules have symmetrical shapes and thus the dipoles gets cancelled and the net dipole moment is zero.

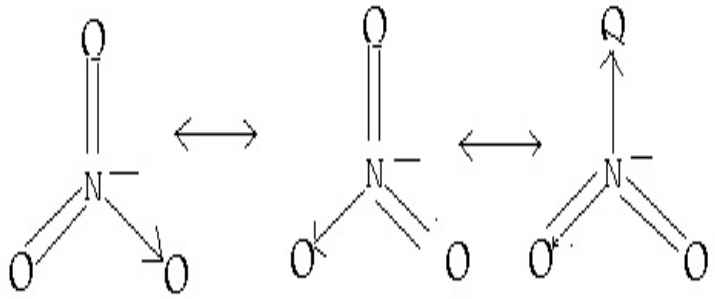
Ans6. Because BF_3 has symmetrical shape, the net dipole moment is zero and thus it is non – polar.

Ans7.



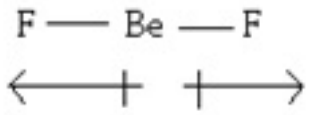
Ans8.

NO_3^-.



Ans9. The dipole moment of the polyatomic molecule depends on individual dipole moments of bonds and also on the spatial arrangement of various bonds in the molecule.

Ans10. In BeF_2 the dipole moment is zero because the two equal bond dipoles point in opposite directions and cancel the effect of each other.



Bond dipoles in BeF_2